The Integrated Receiving Water Impacts Report is a requirement of the Los Angeles County Municipal Stormwater Permit No. CAS0061654. Part VII.D of the Permit states:

"The Principal Permittee shall not later than July 31, 2000, prepare and submit an Integrated Receiving Water Impacts Report. The report shall include, but not be limited to a comprehensive analysis of the results of the different monitoring data (land use, mass emissions, critical source, load assessment, receiving waters, and other pertinent studies available), and feasible environmental indicators. It should also include recommendations on future monitoring requirements, e.g., integration of storm water receiving water monitoring with regional receiving water monitoring, if applicable. This report will be an integral part of the ROWD."

1.1 PURPOSE

The goal of the Monitoring Program is to develop information to support effective watershed stormwater quality management programs. The purpose of these management programs is to reduce pollutants in stormwater discharges to the maximum extent practicable. The major objectives of the Monitoring Program outlined in the Municipal Permit are to:

- track water quality status, pollutant trends and pollutant loads, and identify pollutants of concern;
- monitor and assess pollutant loads from specific land uses and watershed areas;
- identify, monitor, and assess significant water quality problems related to stormwater discharges within the watershed;
- identify sources of pollutants in the stormwater runoff;
- identify and eliminate illicit discharges;
- evaluate the effectiveness of management programs, including pollutant reductions achieved by implementation of BMPs; and
- assess the impacts of stormwater runoff on receiving waters.

These objectives are met through three major types of monitoring and additional studies as their need arises.

1.2 REPORT ORGANIZATION

Section 2 contains a brief history of the station selection process and site descriptions. Maps and tabular descriptions of the tributary areas of each monitored watershed are displayed as Figures 2-1 through 2-14. Section 3 covers methods used for measuring, sampling and analyzing stormwater. Section 4 presents and interprets results, and Section 5 draws conclusions and makes recommendations.

Tables and figures are labeled with two numbers. The first identifies their corresponding section number, and the second is for identification only.

Appendix A contains rainfall contour maps. Program costs are included in Appendix B. An Executive Summary of the Santa Monica Bay Receiving Waters Study by SCCWRP is included in Appendix C. Appendices D and E contain the Low Flow and Wide Channel Pilot Studies respectively. River Toxicity Test results are included in Appendix G. Aerial Deposition Progress Reports are included in Appendix H. A list of people to contact for more information is included in Appendix I.

1.3 RECAP OF MAJOR MONITORING ELEMENTS

The 1994-95 storm season was the first for which stormwater monitoring was accomplished under the 1990 Los Angeles County NPDES Municipal Stormwater Permit, No. CA0061654. During the 1994-95 and 1995-96 seasons, automated and manual sampling was conducted to characterize stormwater quality and quantity in accordance with the 1990 Municipal Permit. The 1994-95 monitoring data is summarized in *Report of Stormwater Monitoring, Winter of 1994-95* (LACDPW, 1996).

The 1996-97 season was the first storm season in which stormwater monitoring was conducted under the new 1996 Municipal Permit (No. CAS614001). For the 1996-97 season the scope of the Monitoring Program was expanded to incorporate further data collection and new pilot studies. The one-year pilot studies, consisting of "Wide Channel" and "Low Flow" analyses, were completed and reported in the *Los Angeles County 1996-97 Stormwater Monitoring Report, July 15, 1997* (LACDPW and Woodward-Clyde, 1997) and are reproduced in Appendices D and E.

The monitoring program, including the Mass Emission, Land Use, and Critical Source elements continued in the 1997-98, 1998-99 and 1999-2000 storm seasons. The 1998-99 storm season also included funding from the Los Angeles County Department of Public Works (LACDPW) to the Southern California Coastal Waters Research Project (SCCWRP) to study the impacts to receiving waters by aerial deposition of pollutants.

At the request of the Natural Resources Defense Council (NRDC), the 1998-99 and 1999-2000 reports include results of the industrial stormwater permit sampling within the county. Due to the limitations of the data set, only summaries of maximum and minimum results can be provided.

In an effort to analyze the presence of PAH in stormwater, Los Angeles County Public Works lowered the detection limit of semi-volatile organics in stormwater samples in the 1999-2000 season by using modified EPA method 625.

1.3.1 Santa Monica Bay Receiving Waters Impact Study

The Santa Monica Bay Receiving Waters Impact Study was conducted for three consecutive storm seasons (1995-98). Three components were studied:

- Stormwater plume characterization
- Water column biology
- Seafloor biology

High turbidity and low salinity characterized stormwater plumes. Generally, the stormwater plumes extended 2-10 meters below the surface and up to several miles offshore. They also persisted for several days.

Toxicity tests found toxic concentrations of dissolved materials in the water column. Zinc was the main toxicant identified in stormwater. There was also toxicity detected from sources other than stormwater.

The benthic community structure remained stable throughout the study. However, there was a high accumulation of contaminants in sea urchins offshore of Ballona Creek. The effects of the bioaccumulation are unknown.

The executive summary is presented in Appendix C, and is excerpted from the *Study of the Impact of Stormwater Discharge on the Beneficial Uses of Santa Monica Bay, July 8, 1999* (SCCWRP, 1999).

1.3.2 Mass Emissions

Mass emission stations capture runoff from major Los Angeles County watersheds that generally have heterogeneous land use. There were ten mass emission stations during the 1990 Municipal Permit and there were five under the 1996 permit. The objectives of the mass emissions stations are to update estimated pollutant loads to the ocean and to identify long term trends in pollutant concentrations, if possible. Four mass emission stations under the 1990 Municipal Permit were equipped with automated samplers to collect composite samples during storms. Grab samples were also taken at these stations. All five mass emission stations under the 1996 NPDES permit had automated samplers where composite and grab samples were taken in accordance with the Municipal Permit.

During the 1998-99 storm season, the station shelter on the Los Angeles River at Wardlow Road was under reconstruction during the entire season due to the raising of the levee walls by the Army Corps of Engineers (ACOE), and the automated sampling equipment was removed. Water quality samples from the Los Angeles River were collected manually at Wardlow Road and were not composited. Results from these manually collected samples were not included in event mean concentration (EMC) calculations. Stream flow data for the Los Angeles River at Wardlow Road was synthesized from three upstream flow stations.

1.3.2.1 Pollutant Loading

Total pollutant loading, as a result of stormwater runoff was first calculated under the 1990 NPDES permit for the 1994-95 storm season. The results were presented in the *Report of Stormwater Monitoring, Winter of 1994-95* (Los Angeles County Department of Public Works, March 1996).

The 1996 NPDES permit in its Section B.4, Attachment C, states that a loads assessment for each of the six WMA's is to be conducted following the 1998-99 storm season. Results were presented in the *Los Angeles County 1998-99 Stormwater Monitoring Report* (Los Angeles County Department of Public Works, July 1999). For those rivers where mass emissions were monitored, loads were calculated from observed flow volumes and observed pollutant concentrations. For those drainage areas that were not monitored, a newly developed GIS model was employed to estimate loads.

Summaries of Total Pollutant Loading, including data from the 1999-2000 storm season, are included in this report.

1.3.3 Land Use Program

The drainage area tributary to each land use monitoring station is comprised predominantly of a single land use and is relatively homogeneous. The major objectives of this monitoring effort are to evaluate the effects of certain land uses on water quality, to identify the relative importance of specific land uses as pollution sources, and to provide data that can be used to project watershed loads from watersheds that do not have mass emission stations.

There were 14 land use monitoring stations under the 1990 Municipal Permit. Five of these stations were equipped with automated samplers to collect composite samples during storms. The 1996 NPDES permit required the re-evaluation of the location of land use specific monitoring stations. The land use monitoring program under the 1996 NPDES permit is a result of a site selection study entitled *Evaluation of Land Use Monitoring Stations* (Woodward-Clyde and Psomas and Associates, 1996). The study identified the most significant land use categories within the permit area regarding stormwater quality. The selection study yielded eight land use stations. These eight land use categories represent over 86% of all the land use within the permit area. These stations monitor flow and have automated samplers to collect flow weighted composite stormwater samples during storm events.

The Santa Monica Pier station was down due to construction during the 1999-2000 storm season.

1.3.4 Critical Sources

The Critical Source/BMP Monitoring Study was introduced under the 1996 NPDES permit and is designed to gather baseline water quality data and assess the effectiveness of BMP implementation for critical industries and businesses. A list of critical sources were identified and ranked by their potential significance to stormwater quality (Woodward-Clyde, 1997) and are listed below:

Industrial Category	SIC code	Industrial Stormwater Permits*
• Wholesale trade (including scrap yards and auto dismantling)	50	Yes
• Automotive repair/parking	75	No
• Fabricated metal products (including electroplating)	34	Yes
• Motor freight (including trucking)	42	Yes
• Chemical manufacturing facilities	28	Yes
• Automotive dealers/gas stations	55	No
• Electric/gas/sanitary	49	No
• Miscellaneous manufacturing	39	Yes

* Industrial facilities requiring general industrial stormwater permits.

For each critical source industry, there is a multi-year study monitoring the stormwater runoff from six sites. During the first year of each study, runoff is sampled and analyzed from five storms. During subsequent years, BMPs are implemented at three of the six sites (test sites). BMP effectiveness is estimated from monitoring data gathered at the pooled test sites and pooled control sites during ten additional storms. A complete study plan is included in *Critical Source Selection and Monitoring Report* (Woodward-Clyde, 1997).

The first critical source monitoring was conducted during the 1997-98 storm season. Sites at six automotive repair shops and six auto dismantlers were monitored. These sites, plus six fabricated metal shops were monitored during the 1998-99 storm season. Six motor freight companies and six automobile dealers were added during the 1999-2000 storm season.

1.4 OTHER STUDIES

Two pilot studies were conducted during the 1996-97 storm season to identify a potential need for modifying monitoring practices. Both studies concluded that existing practices were satisfactory.

Other studies were conducted to explore the effects by aerial deposition, El Niño climatology on stormwater quality, and river toxicity.

1.4.1 Wide Channel Pilot Study

The Wide Channel Pilot Study was developed to evaluate the accuracy of a single point intake in wide channels. Samples were taken at the same time at various depths and widths across the channel to determine the level of mixing achieved.

1.4.2 Low Flow Pilot Study

The Low Flow Pilot Study was conducted to assess the feasibility of monitoring storms as small as 0.1 inches of rainfall. An existing land use monitoring station (Project 1202, Light Industrial) was used for this study.

1.4.3 Aerial Deposition

Data is currently being accumulated to estimate toxic loads deposited into the Santa Monica Bay and inland from atmospheric sources. The Data Assessment Report is scheduled for completion in September 2000. Quarterly progress reports are included in the 1998-99 Los Angeles County Stormwater Monitoring Report and herein Appendix H.

This year, the US EPA, Los Angeles County Department of Public Works, and Southern California Coastal Waters Research Project (SCCWRP) are funding the project. Other parties involved include UCLA's Institute of the Environment, the Santa Monica Bay Restoration Project (SMBRP), the US EPA's Great Water Program, and the South Coast Air Quality Management District (AQMD).

1.4.4 El Niño Study by SCCWRP

The objective of this research was to determine whether El Niño conditions influenced the toxicity of Ballona Creek stormwater or the characteristics of the stormwater discharge plume in Santa Monica Bay. The results indicated that storm size and cumulative amount of prior rainfall had little influence on stormwater toxicity. However, stormwater from rainfall preceded by more than 20 days of dry weather was found to have the highest toxicity. This relationship appeared to be independent of El Niño weather patterns.

The executive summary of the El Niño Study appears in Appendix F.

1.4.5 River Toxicity

During the 1997-98 and 1998-99 storm seasons, tests were conducted for toxicity of samples of dry and wet weather flow from the Los Angeles and San Gabriel Rivers. This testing was performed by the Southern California Coastal Waters Research Project. Toxicity was measured as impairment to sea urchin fertilization.

More details on the study are presented in Appendix G. A summary of finding is listed in Section 4.2.3.